

## Gyroscopic Inertial Micro-Balance Azimuth Locator (GIMBAL), Phase I

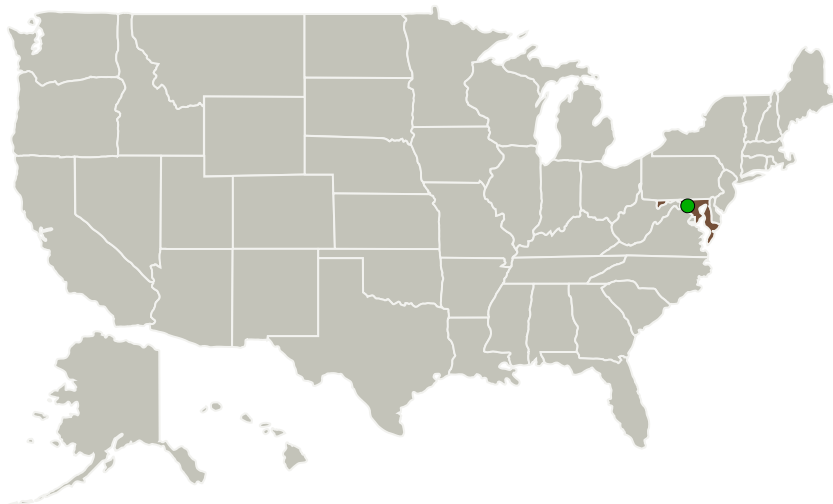


Completed Technology Project (2010 - 2010)

## Project Introduction

Research Support Instruments, Inc. (RSI) proposes the Gyroscopic Inertial Micro-Balance Azimuth Locator (GIMBAL) program to use an innovative encapsulated spinning wheel micro-gyroscope as a Guidance, Navigation, and Control (GN&C) actuator for small spacecraft use. While macro-size gyroscopes, including fiber ring gyros, have achieved navigation-grade performance, Micro-Electro-Mechanical System (MEMS) gyros have been limited to rate-grade performance, particularly in long-term bias drift. This is often attributable to quadrature error, which is a result of cross-coupling between drive and sense axes (Yazdi 1998). GIMBAL is particularly suited to addressing this, since it does not rely on the vibratory structure common in MEMS gyros. Instead, it uses a true spinning wheel for the proof mass, which will not have any mechanical linkages between axes. This will result in a bias drift much smaller than encountered in current MEMS-sized gyros. The Phase I GIMBAL program will involve design, fabrication, and test of the key encapsulated micro-gyro technology as well as system design of the GN&C component. In Phase II, the complete gyro sensor will be designed and built, and detailed tests and demonstrations will resolve design issues for the final design. The result will be a GN&C component that will address a critical need in future NASA science missions.

## Primary U.S. Work Locations and Key Partners



Gyroscopic Inertial Micro-Balance Azimuth Locator (GIMBAL), Phase I

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## Gyroscopic Inertial Micro-Balance Azimuth Locator (GIMBAL), Phase I



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Organizations Performing Work	Role	Type	Location
Research Support Instruments, Inc.	Lead Organization	Industry	Lanham, Maryland
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

## Primary U.S. Work Locations

Maryland

## Project Transitions

**January 2010:** Project Start**July 2010:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139037>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Research Support Instruments, Inc.

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

## Principal Investigator:

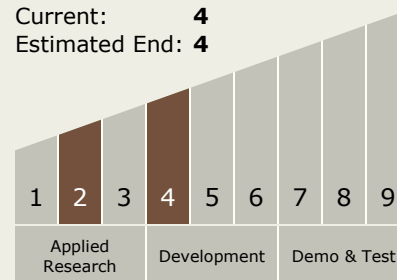
John F Kline

## Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4



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## Technology Areas

### Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - └ TX17.5 GN&C Systems Engineering Technologies
    - └ TX17.5.1 GN&C System Architectures, Requirements and Specifications

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System